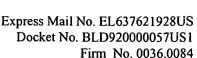




WHAT IS CLAIMED IS:

	··· · · · · · · · · · · · · · · · · ·	
1	1 A method for halftoning data for an output of	levice capable of rendering
2	multiple intensities, comprising:	
3	3 receiving input values;	
4	for each received input value, performing:	
5	5 (i) using the input value as an output value is	f the input value is a
6	predetermined value; and	
7	7 (ii) halftoning the input value to produce an	output value used to
8	render one of multiple intensities if the input value is not the predetermined	
9	9 value.	
1	1 2. The method of claim 1, further comprising u	ising the output values to
2	select intensities to be rendered on the output device.	
1	1 3. The method of claim 1, wherein the predeter	mined value represents
2	full saturation.	
1	1 4. The method of claim 1, wherein the output d	levice comprises one of a

- 2 printer, display monitor, storage or transmission device.
- 1 5. The method of claim 1, wherein there are two predetermined values, 2 and wherein the input value is used as the output value if the input value is one of the 3 predetermined values.
- 1 6. The method of claim 1, further comprising using the output values to select intensities to be rendered on the output device.





6

7

8

9



7. The method of claim 1, wherein the input value is in a first intensity range and the output value is in a second intensity range of values that are capable of being rendered by the output device.

- 1 8. The method of claim 7, wherein the first and second intensity ranges 2 comprise a plurality of intensity values, and wherein the second intensity range has 3 fewer intensity values than the first intensity range.
- 9. The method of claim 7, wherein the first and second intensity ranges comprise a plurality of intensity values, and wherein the first intensity range has fewer intensity values than the second intensity range.
- 1 10. The method of claim 7, wherein halftoning the input value further 2 comprises:

determining a value for the input value from a first matrix of values;
using the input value and the determined value to produce an intermediate

5 output value in the first intensity range; and

using a second matrix to determine one output value in the second intensity range based on the intermediate output value in the first intensity range, wherein the second matrix provides one output value in the second intensity range for any given intermediate output value in the first intensity range.

- 1 11. The method of claim 10, wherein using the input value and the determined value from the first matrix comprises:
- subtracting the determined value from the input value to produce the
 intermediary output value.





1	12. The method of claim 10, further comprising:	
2	determining whether the input value is greater than or equal to the determined	
3	value from the first matrix, wherein the second matrix is used to determine one output	
4	value in the second intensity range if the input value is greater than the determined	
5	value; and	
6	using a predetermined output value in the second intensity range if the input	
7	value is less than the determined value from the first matrix.	

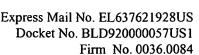
- 1 13. The method of claim 12, wherein the predetermined output value used 2 if the input value is less than the determined value from the first matrix comprises a 3 lightest color value in the second intensity range.
- 1 14. The method of claim 10, wherein the second matrix comprises a 2 mapping of intermediate output values in the first intensity range to monotonically 3 increasing values in the second intensity range, and wherein multiple values from the 4 first intensity range map to a same value from the second intensity range.
- 1 15. The method of claim 10, wherein the first matrix is produced using a 2 dithering algorithm.
- 1 16. The method of claim 10, wherein the second matrix does not include 2 any output intensity values in the second intensity range that produce unreliable print 3 results.
- 1 17. A system for halftoning data, comprising:
- 2 an output device capable of rendering multiple intensities;
- 3 means for receiving input values;
- 4 means for performing, for each received input value:





-16- Express Mail No. EL637621928US Docket No. BLD920000057US1 Firm No. 0036.0084

5 (i) using the input value as an output value if the input value is a 6 predetermined value; and 7 (ii) halftoning the input value to produce an output value used to 8 render one of multiple intensities on the output device if the input value is not 9 the predetermined value. 1 18. The system of claim 17, further comprising means for using the output 2 values to select intensities to be rendered on the output device. The system of claim 17, wherein the predetermined value represents 1 19. 2 full saturation. 1 20. The system of claim 17, wherein the output device comprises one of a 2 printer, display monitor, storage or transmission device. 1 21. The system of claim 17, wherein there are two predetermined values, 2 and wherein the input value is used as the output value if the input value is one of the 3 predetermined values. 1 22. The system of claim 17, further comprising means for using the output 1 values to select intensities to be rendered on the output device. 1 23. The system of claim 17, wherein the input value is in a first intensity 2 range and the output value is in a second intensity range of values that are capable of 3 being rendered by the output device.



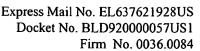




1 24. The system of claim 23, wherein the first and second intensity ranges 2 comprise a plurality of intensity values, and wherein the second intensity range has 3 fewer intensity values than the first intensity range. 1 25. The system of claim 23, wherein the first and second intensity ranges 2 comprise a plurality of intensity values, and wherein the first intensity range has fewer 3 intensity values than the second intensity range. 1 26. The system of claim 23, wherein the means for halftoning the input 2 value further comprises: 3 determining a value for the input value from a first matrix of values; 4 using the input value and the determined value to produce an intermediate 5 output value in the first intensity range; and 6 using a second matrix to determine one output value in the second intensity 7 range based on the intermediate output value in the first intensity range, wherein the 8 second matrix provides one output value in the second intensity range for any given 9 intermediate output value in the first intensity range. 1 27. The system of claim 26, wherein the means for using the input value 2 and the determined value from the first matrix comprises: 3 subtracting the determined value from the input value to produce the 4 intermediary output value. 1 28. The system of claim 26, further comprising: 2 means for determining whether the input value is greater than or equal to the 3 determined value from the first matrix, wherein the second matrix is used to 4 determine one output value in the second intensity range if the input value is greater

than the determined value; and

5



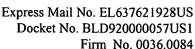


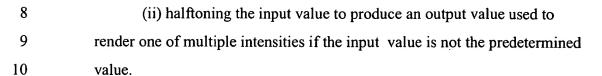


6 means for using a predetermined output value in the second intensity range if 7 the input value is less than the determined value from the first matrix.

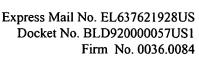
- 1 29. The system of claim 28, wherein the predetermined output value used 2 if the input value is less than the determined value from the first matrix comprises a 3 lightest color value in the second intensity range.
- 1 30. The system of claim 26, wherein the second matrix comprises a 2 mapping of intermediate output values in the first intensity range to monotonically 3 increasing values in the second intensity range, and wherein multiple values from the 4 first intensity range map to a same value from the second intensity range.
- 1 31. The system of claim 26, wherein the first matrix is produced using a dithering algorithm.
- 1 32. The system of claim 26, wherein the second matrix does not include 2 any output intensity values in the second intensity range that produce unreliable print 3 results.
- 1 33. A program for halftoning data for an output device capable of
 2 rendering multiple intensities, wherein the program includes code embedded in a
 3 computer readable medium and capable of causing a processor to perform:
 4 receiving input values;
 5 for each received input value, performing:
- 6 (i) using the input value as an output value if the input value is a 7 predetermined value; and







- 1 34. The program of claim 33, wherein the program code is further capable of causing the processor to perform using the output values to select intensities to be rendered on the output device.
- 1 35. The program of claim 33, wherein the predetermined value represents full saturation.
- 1 36. The program of claim 33, wherein the output device comprises one of 2 a printer, display monitor, storage or transmission device.
- 1 37. The program of claim 33, wherein there are two predetermined values, 2 and wherein the input value is used as the output value if the input value is one of the 3 predetermined values.
- 1 38. The program of claim 33, wherein the program code is further capable of causing the processor to perform using the output values to select intensities to be rendered on the output device.
- 1 39. The program of claim 33, wherein the input value is in a first intensity range and the output value is in a second intensity range of values that are capable of being rendered by the output device.





6

7

8

9



1 40. The program of claim 39, wherein the first and second intensity ranges 2 comprise a plurality of intensity values, and wherein the second intensity range has 3 fewer intensity values than the first intensity range.

1 41. The program of claim 39, wherein the first and second intensity ranges 2 comprise a plurality of intensity values, and wherein the first intensity range has fewer 3 intensity values than the second intensity range.

1 42. The program of claim 39, wherein halftoning the input value further 2 comprises:

determining a value for the input value from a first matrix of values;

using the input value and the determined value to produce an intermediate output value in the first intensity range; and

using a second matrix to determine one output value in the second intensity range based on the intermediate output value in the first intensity range, wherein the second matrix provides one output value in the second intensity range for any given intermediate output value in the first intensity range.

- 1 43. The program of claim 42, wherein using the input value and the determined value from the first matrix comprises:
- subtracting the determined value from the input value to produce the
 intermediary output value.
- 1 44. The program of claim 42, wherein the program code is further capable 2 of causing the processor to perform:
- determining whether the input value is greater than or equal to the determined value from the first matrix, wherein the second matrix is used to determine one output



Express Mail No. EL637621928US Docket No. BLD920000057US1 Firm No. 0036.0084

- value in the second intensity range if the input value is greater than the determined
 value; and
- using a predetermined output value in the second intensity range if the input value is less than the determined value from the first matrix.
- 1 45. The program of claim 44, wherein the predetermined output value used 2 if the input value is less than the determined value from the first matrix comprises a 3 lightest color value in the second intensity range.
- 1 46. The program of claim 42, wherein the second matrix comprises a 2 mapping of intermediate output values in the first intensity range to monotonically 3 increasing values in the second intensity range, and wherein multiple values from the 4 first intensity range map to a same value from the second intensity range.
- 1 47. The program of claim 42, wherein the first matrix is produced using a 2 dithering algorithm.
- 1 48. The program of claim 42, wherein the second matrix does not include 2 any output intensity values in the second intensity range that produce unreliable print 3 results.